NC DENR/DWQ WASTEWATER/GROUNDWATER LABORATORY CERTIFICATION BRANCH

LABORATORY NAME:		CERT #:	
PRIMARY ANALYST:		DATE:	
NAME OF PERSON COMPLETING CHECKLIST (PRINT):			
SIGNATURE OF PERSON COMPLETING CHECKLIST:			

Parameter: **Turbidity**
Method: **Standard Methods, 2130 B-2020**

Turbidity is considered a method-defined parameter per the definition in the Code of Federal Regulations, Part 136.6, Section (a) (5). This means that the method may not be modified per Part 136.6, Section (b) (3).

EQUIPMENT:

	Turbidity Meter (Nephelometer) **List Make/Model:**		Sample cells		Analytical Balance		Class A Volumetric Glassware

PLEASE COMPLETE CHECKLIST IN INDELIBLE INK
Please mark Y, N or NA in the column labeled LAB to indicate the common lab practice and in the column labeled SOP to indicate whether it is addressed in the SOP.

	GENERAL INFORMATION	LAB	SOP	EXPLANATION
1	Is the SOP reviewed at least every 2 years? What is the most recent review/revision date of the SOP? [15A NCAC 02H .0805 (a) (7)] **Date:**			Quality assurance, quality control, and Standard Operating Procedure documentation shall indicate the effective date of the document and be reviewed every two years and updated if changes in procedures are made. Verify proper method reference. During review notate deviations from the approved method and SOP.
2	Are all review/revision dates and procedural edits tracked and documented? [15A NCAC 02H .0805 (a) (7)]			Each laboratory shall have a formal process to track and document review dates and any revisions made in all quality assurance, quality control and SOP documents.
3	Is there North Carolina data available for review?			If not, review PT data.
	PRESERVATION and STORAGE	**LAB**	**SOP**	**EXPLANATION**
4	Are samples iced to above freezing but ≤ 6 ºC during shipment? [40 CFR 136 Table II]			
5	Are samples refrigerated to above freezing but ≤ 6 ºC during storage? [40 CFR 136 Table II]			
6	Are samples analyzed within 48 hours of collection? [40 CFR 136 Table II]			
	PROCEDURE – Meter Calibration	**LAB**	**SOP**	**EXPLANATION**
7	Is the meter calibrated according to the manufacturer's instructions daily? [SM 2130 B-2020 (4) (b)]			Auditor should verify mfg calibration instructions.
8	Is a pre-calibrated, factory-set calibration used? If no, skip to question 11.			
9	Is at least one standard analyzed in each instrument range used for sample analysis? [SM 2130 B-2020 (4) (b)]			
10	What type of standard is used? Primary or Secondary? See bottom of last page for standard definitions. Skip to question 13. **Answer:**			
11	If a pre-calibrated scale is not supplied, are calibration standards prepared for each range of the instrument? [SM 2130 B-2020 (4) (b)]			
12	List the ranges of your meter and the concentrations of the standards used to calibrate the meter in those ranges? **Answer:**			

13	Are primary* standards used for calibration? [SM 2130 B-2020 (3) (d)]			Primary standards are defined as standards that are prepared daily from user-prepared formazin suspensions, commercial stock formazin suspensions, and commercial styrene-divinylbenzene suspensions. These would generally all be 4000 NTU standards.
14	If primary standards are used, are they prepared fresh immediately before use? [SM 2130 B-2020 (3) (c)]			Dilute 4000 NTU primary standards with high-quality dilution water. Prepare immediately before use and discard after use.
15	Are primary calibration standards prepared with low turbidity water (≤0.02 NTU)? [SM 2130 B-2020 (3) (a)]			
16	Are secondary** standards recommended by the instrument manufacturer used for calibration? [SM 2130 B-2020 (3) (d)]			Secondary standards are commercially prepared and certified, stabilized **sealed** liquid or gel turbidity standards.
17	Per manufacturer's instructions, are the secondary standards used to calibrate the meter daily or as a calibration check to determine if calibration with primary standards is required? [SM 2130 B-2020 (3) (d)]			
18	If sealed standards are not used, are matched pairs of sample cells or the same sample cell used for standardization and sample analysis? [SM 2130 B-2020 (2) (b)]			
	PROCEDURE- Sample Analysis	**LAB**	**SOP**	**EXPLANATION**
21	If condensation develops on the outside of the sample cell, is care taken to ensure that all condensation is removed from the outside of the sample cells and if it cannot be easily removed, is sample warmed until fogging of glass no longer occurs? [SM 2130 B-2020 (4) (a)]			Wiping with a Kim-wipe or other non-scratching cloth is acceptable.
22	Is care used to ensure sample cells are clean and free of scratches? [SM 2130 B-2020 (2) (b)]			Never handle where light beam passes through. Clean inside and out with lab soap and rinse well with distilled/deionized water. Allow to air dry. If handled after cleaning, wiping with a Kim-wipe may be all this needed to remove any finger smudges. In extreme cases, cell may be coated with a thin layer of silicone oil with the same refractive index as glass to mask minor imperfections and scratches.
23	Is sample gently agitated to ensure homogeneity? [SM 2130 B-2020 (4) (c)]			
24	Is the sample poured into the sample cell after bubbles are allowed to disappear? [SM 2130 B-2020 (4) (c)]			
25	Is the sample degassed (Optional)? [SM 2130 B-2020 (4) (c)]			This is an option. It is not required. When possible, pour well-mixed sample into cell and immerse it in an ultrasonic bath for 1 to 2 seconds or apply vacuum degassing, causing complete bubble release. IF degassing cannot be applied, bubble formation will be minimized if the samples are maintained at the temperature and pressure of the water before sampling.
26	If so, what procedure is used to degas samples? [SM 2130 B-2020 (4) (a)] **Answer:**			Remove air or other entrained gases in the sample before measurement. Preferably degas even if no bubbles are visible. Degas by applying a partial vacuum, adding a nonfoaming-type surfactant, using an ultrasonic bat, or applying heat. In some cases, two or more techniques may be combined for more effective bubble removal.
27	Is turbidity recorded at first stable reading? [SM 2130 B-2020 (4) (b)]			Make certain the nephelometer gives stable readings in all sensitivity ranges used.
	QUALITY ASSURANCE	**LAB**	**SOP**	**EXPLANATION**
28	What is the acceptance criteria of the standards analyzed in each instrument range? [15A NCAC 02H .0805 (a) (7) (A)]			Unless specified by the method or this Rule, each laboratory shall establish performance acceptance criteria for all quality control analyses.
29	What corrective action does the laboratory take if the standard results are outside of established control limits or method accuracy limits? [15A NCAC 02H .0805 (a) (7) and (g) (8)]			If quality control results fall outside established limits or show an analytical problem, the laboratory shall identify the Root Cause of the failure. The problem shall be resolved through corrective action, the corrective action process documented, and any samples involved shall be reanalyzed, if possible.

30	Is the result reported with the proper significant figures based on the sample range? [SM 2130 B-2020 (5)]			Turbidity Range / Report to the nearest 0-1.0 / 0.05 1-10 / 0.1 10-40 / 1 40-100 / 5 100-400 / 10 400-1000 / 50 >1000 / 100
31	Is the result reported with proper units of measure? [SM 2130 A-2020 (2)] [15A NCAC 02H .0805 (a) (7) and (g) (2) (L)]			NTU
32	If secondary standards are used beyond their manufacturer expiration dates, are their concentrations verified against a primary standard at the date of expiration and quarterly thereafter? [NC WW/GW LCB Turbidity Standards Policy]			Secondary standards may be used beyond their expiration date only if their concentrations are verified against a primary standard at the date of expiration and quarterly thereafter, and are shown to be within 10% of their original concentration.
33	Is the data qualified on the Discharge Monitoring Report (DMR) or client report if Quality Control (QC) requirements are not met? [15A NCAC 02H .0805 (e) (5)]			If the sample cannot be reanalyzed, or if the quality control results continue to fall outside established limits or show an analytical problem, the results shall be qualified as such. Reported data associated with quality control failures, improper sample collection, holding time exceedances, or improper preservation shall be qualified as such.

* Primary standards are defined as liquid suspensions prepared from hydrazine sulfate and hexamethylenetetramine or a commercially certified stock formazin suspension.

** Secondary standards are defined as commercially prepared, stabilized, sealed liquid or gel turbidity standards calibrated against properly prepared and diluted formazin or styrene divinylbenzene polymers.

Secondary standards may be used beyond their expiration date only if their concentrations are verified against a primary standard at the date of expiration and quarterly thereafter, and are shown to be within 10% of their original concentration.

Additional Comments:

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Inspector: _____ Date: _____